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MAGYAR ORNITHOLOGIAI KÖZPONT
HUNGARIAN CENTRAL OFFICE OF ORNITHOLOGY

# RECENSIO CRITICA AUTOMATICA

OF THE

# DOCTRINE OF BIRD-MIGRATION

BY

**OTTO HERMAN**

late Member of the Hungarian Parliament, Chief of the Hungarian Central Office of Ornithology, Fellow of the Royal Hung. Society of Natural History, Hon. Member of the «Deutsche Ornithol. Ges.», of the «Ornithol. Gesellsch. in Bayern», of the «Deutscher Verein zum Schutze der Vogelwelt», of the Oesterr. Bund der Vogelfreunde, Graz, Honorary President of the Hungarian Society for the Prevent. of Cruelty to Animals at Budapest, Köszeg, Sopron, Editor of the «Aquila» etc.

WITH ONE MAP.

BUDAPEST
PRINTED BY ORDER OF THE ROYAL HUNGARIAN MINISTRY OF AGRICULTURE
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PRINTED BY VIKTOR HORNYÁNSZKY, BUDAPEST.

DEDICATED

TO THE

BRITISH ORNITHOLOGISTS' UNION

ON THE OCCASION

OF THE FOURTH INTERNATIONAL
ORNITHOLOGICAL CONGRESS

IN LONDON 1905

THE AUTHOR

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# PREFACE.

When the second International Ornithological Congress was held in Budapest, the capital of the Hungarian Kingdom, in 1891, we had the pleasure of welcoming also Englishmen, the first, if I am right, who have ever appeared at a continental ornithological meeting. Among them DR. R. BOWDLER SHARPE, the well-known keeper of the ornithological department of the British Museum, chairman of the section of „Systematic Ornithology", submitted a most valuable paper* on this subject. Moreover he honoured us Hungarians by delivering an address on the same matter.

Thanks to the munificence of the Royal Hungarian Ministry of Agriculture, I am enabled to return the courtesy rendered to us by a member of the B. O. U., by respectfully dedicating to it the following paper.

I have intentionally chosen as subject *„Recensio critica, automatica of the Dotrine of Bird-Migration"* because this manifestation in Bird-

* „A review of recent attempts to classify Birds; an address delivered before the second International Ornithological Congress on the 18. of May 1891. Budapest". (Published at the Office of the Congress.)

life was the chief cause for the holding of the first International Ornithological Congress, held in Vienna in 1884. The late Crownprince RUDOLPH had intended to create an international organisation, though, as regards the plan of observation and treatment, no agreement was made.

It is the H. C. O.* alone which since that time has worked in a purely systematical manner, having in the course of ten years established numerous permanent observation-stations, the results of the work of which have been compiled and published, including, as far as possible, also investigations from other countries.

On account of its interzonal character Bird-Migration ought to be the subject of international investigation, for even the most elaborate observations of a smaller area depend also, just as is the case with Meteorology, on observations in the other neighbouring regions. Although at both Congresses certain resolutions were passed concerning the creation of an internation alorganisation, the „Permanent International Ornithological Committee", founded in Vienna in 1884, did nothing to carry out these regulations. At the third International Ornithological Congress in Paris in 1900, the resolution concerning international observations over the whole of Europe on the Swallow (Hirundo rustica) and the Stork (Ciconia ciconia) had the same result — all remained on paper.

Ornithologists in the various countries, therefore, work as regards Ornithophaenology according to their own judgment, an isolation, which is not favourable to leading us to a full understanding of Bird-Migration.

On the occasion of the ornithological meeting at Sarajevo** in 1899, the attempt to inaugurate cooperative observations in Hungary, Austria, Bosnia and Herzegovina was happily successful, but only

* „Hungarian Central-Office of Ornithology".

** Of the resolution in „Aquila" VIII 1901. pp. 147—155.

as regards the methodical treatment; the work itself has been carried on by Hungary alone without any interruption.

It is perhaps still a question of the earnestness and dignity of Ornithology as a branch of Science, whether, amidst the enormous progress attained in all departments of Science, the phenomenon of Migration, which is of such eminence in Ornithology, should be treated henceforth too rather as a pastime, and whether it shall remain in future also a field for sentences, quite out of keeping with the present state of Science?

In recommending my essay to the attention of the British Ornithologists' Union, I hope that the followers of DERHAM, who two hundred years ago (1708) worked as pioneer in Ornithophaenology, will find ways and means of initiating better proceedings, especially as regards a methodical treatment of the results of the observations.

LILLAFÜRED in Hungary, September 1904.

OTTO HERMAN.

# INTRODUCTION

MOTTO.

„Just as Meteorology was only a mass of statistical data before the simultaneous facts were, day by day, schematised, so will Ornithophaenology remain but a mass of statictical data, until the compilation of the simultaneous observations and the schematising of the Phenomena of Migration, at least in regard to some peculiarly characteristic species, is carried out". J. HEGYFOKY „Aquila" VI 1899. p. 9.

The statement, that an enquiry into the bodily peculiarities and manifestation of life in Birds is not more important, than the investigation and appreciation of the same in other living beings, is irrefutable. — The problem of the comprehension of animal life is a uniform task for all mankind; and if investigation divides the problem into more or less definite parts, this is only a distribution of labour, which is rendered absolutely necessary by the natural inadequacy of the physical powers of the individual investigator.

The ultimate aim in the investigation of the parts, as in that of the whole, is one and the same, viz. to apprehend the problem of animal life in its origin, its development and organisation both in itself and in reciprocal action with the other Phenomena of what we call „Nature".

Our contemplation of Nature leads us, in considering the unbounded manifestations of animal life, to the conclusion that the problem whether in respect of time, space or comprehension, is an inexhaustible one, that the experience of generations does not offer us the full understanding, the essence of the Phenomena and of their meaning, but only a faint and, in consequence of the many breaks, a loose connexion, the perfecting of which must be made the object of unflagging labour.

The manifestations of life in the organic connexion with animals and in the influence on Nature, grouped in reference to time, place and elevation, are inexhaustible, and form the „daily bread" of the very greatest investigator, just as of him to whom only the Phenomena of a very small district are assigned.

But also within the parts into which we are obliged to divide the question, there are problems which, only solvable by experience, demand a methodical partition of work and consequently uniform methodical treatment, since there is no other way of approaching the essence of the problem.

If we consider Birds from the point of view just expounded, we can ask the question: Do Birds, compared with other animals, either in respect to bodily structure or manifestations of life, or both of these, possess peculiarities, which can form the object of special research, being specially characteristic of the Bird and requiring special treatment?

Among Birds, we do find such a peculiarity in the fact that a considerable number of species, in accordance with the change of seasons, undertake regular Migrations. They migrate from one zone to another and thereby periodically avoid those influences of certain districts, which are unfavourable to their propagation. Hence it follows that these Migrations, as we understand them, signify a number of preliminary conditions, which seem to go beyond the idea „animal", and even touch upon the „mysterious" and „incomprehensible".

For it is not the power of flight which, from an ornithological point of view, needs special treatment, but the vast regular Migratory Movement — Passage — through the zones, which from year to year is regularly performed, and is repeated not only by the species, but by the individual to the end of life.

It is the deeper biological comprehension of this special Phenomenon which in its course can only by a methodical distribution of labour, by a uniform and strictly methodical treatment be brought closer to a

scientific solution; indeed only by means of correct induction, by the exclusion of all speculation, to which the seeming „Mystery", the so-called „Wonderfulness" or „Inexplicableness" opens so wide a field.

The power of flight is certainly also an essential condition to Migration on the part of Birds, but considered in itself, it is not a special characteristic of this class. As a peculiar power and in its manifold changes, we find it not only among highly developed Vertebrata, but also in the Insect class, and here just as in the case of Birds we find it to be not only a means of locomotion, but far more an essential condition of life, without which the species and the individual cannot acquire the food necessary for their existence.

We can easily understand that this regularly recurring Phenomenon of Migration, even in antiquity, attracted the curiosity of mankind in general, but particularly that of the scientist. The Phenomenon which in its course avoided and still avoids the rational observation of man, remained enveloped in mysterious darkness. This darkness affected, and still affects, not so much the intellect as the imagination of man, and to some extent also that of the investigator. But imagination is known to be a very bad adviser and the most unreliable guide conceivable in cases, where we must stand solely on the firm ground of facts.

As far as the Phenomenon of Migration is concerned, BACON of VERULAM has in many respects lived in vain. From a few data dealing with a small area, to draw conclusions which extended to, and embraced zones, and, where neither data nor conclusions were or are to be had, to put forward the „Mysterious" and then draw inferences, was then and is often now even „Method"!!

The only change is the call for „Facts"! The records dealing with the day, hour, direction, course of the wind and weather chosen for the Migration and the manifestations of life among Birds; the sorting of these data according to locality, time and species; such and other calculations are worked out with little or no coherence. They are then published as „Treatment", though strictly speaking they are

only a confused mass of data which would only hamper the methodical treatment even if they had originated from methodical compilation. To put it shortly: even in our own day, while „Meteorology", which is organically connected with the Migration of Birds, can boast triumphs due only to the strict inductive method of its investigations and treatment, its sister „Ornithophaenology", with few exceptions, lingers within the sphere of sophistry. Except in a few cases, a kind of passion prevails to set about the matter in the easiest way, and to put the subjective idea (often pronounced „firm conviction") before the actual result, viz. the proposition obtained by methodical induction.

That this cannot be the way by which we can further proceed is perfectly clear and manifest. Hence arises the question: In which direction must we proceed if we wish Ornithophaenology also to reach a level and take a course compatible with the present position and advance of science?

If we consider the state and the progress in the sphere of Meteorology as displayed to us to day, and then cast a glance on the early history of this branch of Science, we have before us a perfectly clear, intelligible view of the course of evolution.

Meteorology also was once in its infancy. The reading, three times a day, by primitive instruments, never compared with others, the properties and value of which were consequently problematical, „the weather-forecasts" derived by these imperfect, entirely local data for politically limited districts — all these former modes of treatment in Meteorology coincide exactly with the common method used in Ornithophaenology nowadays. Here also local and in the majority of cases purely „chance-data" suffice for the boldest combinations, the value of which is not one whit greater than the former „weather-forecasts" of the old „observing weather-prophets".

And if we now ask the question: Why has Meteorology become a distinguished branch of Science, of great significance and with a deep influence even on practical life? we must answer: Dilettantism and

amateurism were confined with in proper limits; the place of uncritical groping in the dark was taken by methodical observation founded on well-established facts and by real methodical treatment; the cultivation of this branch of science, the importance of which was perfectly well recognised, was entrusted to well-equipped institutes; so its development was secured, the soundness of the results obtained guaranteed.

Ornithophaenology has to follow exactly the same course; it lies in the nature of the thing that it can have no other.

The objection will certainly be raised that we cannot attach to Bird-Migration the same amount of importance that we impute to the course of the weather, with which many highly important and vital interests of mankind are connected. As regards the question of importance this is quite correct, but this is no reason why a scientific problem which is, in the respect just mentioned, of minor importance, should proceed on a wrong tack. For Science does not recognise „important" and „unimportant" problems, but only problems requiring solution.

And after all, Ornithophaenology also is not entirely wanting in all practical or important relations with mankind.

The periodical change of locality of the enormous masses of migrating birds signifies at the same time the transference of work from one zone to another, an energetic, mighty upheaval of the course of Nature and of the conditions which man has, by culture, created for his benefit. What does this restless, assiduous work of the birds in its many phases mean for field, wood, garden, cattlebreeding — quite apart from the aesthetic, ethic, deep effects of the same? And we have to reply, that this action, working mostly like a regulator, cannot be replaced or dispensed with: that the sums which this work signifies for man are not large but simply enormous: that the Bird, compared with the course of the weather (although of secondary importance) must never be undervalued and that the exact understanding of these relations in organic connection with Migration, although they require no special institution, yet deserve serious exertion and due sacrifice.

Since the existence of the H. C. O. I always endeavoured to throw light upon the matter. The first step must naturally be the history of this branch of Science. For this history is not only in a purely human sense „vitae magistra", but also „magistra scientiae", especially in the sphere of induction (empiricism).

On the occasion of the second International Ornithological Congress held in 1891 in Budapest, I gave a perfectly objective sketch of the historical development of the knowledge of Migration, and at once made use of the same to compile the whole material of data chronicled in Hungary.* In volume VI of „Aquila", the periodical of the H. C. O., I published, under the heading „Vom Zuge der Vögel auf positiver Grundlage", a collective treatise, in which, besides the results accumulated during four years in Hungary, I published a series of opinions or Theses on this matter, from EMPEROR FREDERIC II. (1194—1250) to the present day, showing frequently great diversity and contradiction on the part of even foremost authorities. Recently a historical review was worked out and published in an enlarged edition by JACOB SCHENK,** first Assistant of the H. C. O.

While engaged in systematically carrying out these works, the H. C. O. was continually active, so far as their resources allowed, in collecting all available material for the foundation of the true knowledge of Bird-Migration. Assisted by men like the Meteorologists J. HEGYFOKY, the Ornithologists and Ornithophaenologists GASTON GAAL DE GYULA, JULIUS PUNGUR, auxiliary help-mates, like E. SZALAY, J. SCHENK, A. VEZÉNYI; voluntarily observing Ornithologists, like G. ERTL, A. VON WACHENHUSEN, Baron SNOUCKAERT VAN SCHAUBURG, the Meteorologist EKAMA, E. VON MIDDENDORFF, Miss HELENE VON MIDDENDORFF, KAIGORODOFF, M. HAERMS, O. HAASE, and others;

* Herman O.: „Die Elemente des Vogelzuges in Ungarn bis 1891." in Hung. and German 1895.

** „Die Frage der Vogelzuges" Suppl. to Vol. IX. of „Aquila" 1902.

a system of observers, with such men as Count C. FORGÁCH, STEFAN CHERNEL VON CHERNELHÁZA, J. VON CSATÓ, Count J. MAJLÁTH A. VON BUDA, TITUS CSÖRGEY at their head; the staff of the Royal Forest-Department, which has since 1890 been working with clockwork regularity, — all these, united with the fact that the Government and Legislature of Hungary have supported the work with a munificence quite unprecedented, have made it possible to attain results which perhaps deserve some notice.

V. VON TSCHUSI: (in: Ornith. Jahrbuch 1904. p. 115) writes: „it ought to be acknowledged that the H. C. O. has paved the way for a scientific Ornithophaenology." This frank acknowledgement of one of the chief authorities for Palaearctic Ornithology is certainly encouraging. In the meantime we are satisfied to have been able to point out the right direction.

Miss HELENE VON MIDDENDORFF in Hellenorm (Esthonia), the granddaughter of A. von Middendorff, author of the „Isepiptesen Russlands" (1855), has generously presented the H. C. O. with all the material on Bird-Migration left by her late grandfather, a most valuable gift, for which we express our sincerest thanks.

# RECENSIO CRITICA, AUTOMATICA OF THE ROUTES OF MIGRATION

See the Map.

Regarding the criticism, in my opinion there is still one gap left which I purpose to fill up with the map accompanying this paper. It shows the *Routes of Migration* compiled from various authors, not only from their cartographical publications, but in some cases also according to their written directions. It is only natural that the map is not exhaustive, for two reasons: firstly, because the widely scattered material was not all at my disposal; secondly, because to draw in all that is noted down, even the local Migration-routes and directions, would have been a Gordian Knot, to unravel which the span of life still left to me would be inadequate; and modesty forbade me to employ the method of ALEXANDER THE GREAT.

The sources for this map are as follows:

1. *BORGGREVE: „Die Vogelfauna von Norddeutschland". 1896.*
2. *BREHM, CH. L.: „Der Zug der Vögel". Isis. 1828., Naumannia 1855.
3. DIXON: „The Migration of British Birds". 1895.

* The books marked with an asterisk contain no maps.

4. *GÄTKE: „Die Vogelwarte Helgoland“ 1891.(also with J. Cordeaux).
5. *HARTMANN: „Ströda Bidrag till Skandinavisk Fauna“ 1858.
6. *HIERONYMUS: „Über das periodische Verschwinden vieler Vögel zur Herbstzeit“ 1857. Journ. f. Ornith.
7. *KESSLER: „Einige Beiträge zur Wanderungsgeschichte der Zugvögel“ Bull. de la Soc. des Nat. de Moscou, 1853.
8. MENZBIER: „Die Zugstrassen der Vögel im europäischen Russland“ Bull. de la Soc. des Nat. de Moscou, 1886.
9. MIDDENDORFF A.: „Die Isepiptesen der Vögel im europäischen Russland“ 1855.
10. *MIDDENDORFF A.: „Sibirische Reise“ Tom. IV. 1873—1874.
11. *NAUMANN: „Naturgeschichte der Vögel Deutschlands“ I. 1880.
12. PALMÉN: „Om foglarnes flyttingsvägar“ 1874.
13. QUINET: „Consid. sur les Oiseaux d'Egypte“ Ornis XII. 1902—3.
14. *SCHLEGEL: „De Dieren van Nederland“ 1860.
15. SEVERTZOW: „Allgemeine Übersicht der aralo-tianschanischen Ornis.“ Journ. f. Ornith. 1873—76.
16. SEVERTZOW: „Etudes sur le passage des Oiseaux dans l'Asie Centrale part. par le Ferghanah et le Pamyr.“ 1875.
17. *WALLENGREEN: „Die Brütezonen der Vögel innerhalb Skandinaviens“ Naumannia 1854—56.
18. *CORDEAUX: „On the Migration of Birds etc.“ Compte rendu II. Int. Orn. Congress at Budapest. 1892 p. 165.

A glance at the annexed map should explain the statement that Birds in their Migration from one zone to another, even if they had the will, could not possibly follow all directions which authors invented for them, and herein lies the weakness of the method which is founded almost on mere supposition.

I have allowed myself only to draw a single line and that on positive grounds. From PALMÉN's Migration-routes, I take the line „Nile“ — which there, begins at about the latitude of Cairo — with Lado (lat. 5° 2′ 0″ N., long. 50° E., 465 Metres above sea-level) as the starting

point, because in connexion with this place we posses an interesting series of data supplied by EMIN PASCHA.

Further, as regards Heligoland, I have followed J. CORDEAUX as well as GÄTKE; for we owe the excellent observations on the crow flight over Heligoland towards England to these enthusiastic investigators.

I have included HARTMANN also, because he has treated the Migration along the Meridian; and HIERONYMUS, because he accepts the deflective influence of the Alps and so on.

To the point of Lado I attribute special importance. The EMIN series, which further on, we, will get to know better, is like a strong nail driven in the soil of Africa, to which we can safely cling. For, to tell the truth, it is difficult to conceive what grounds authors can give to support themselves, when they plant the drawing pen on the map, somewhere in the Tropic of Cancer, and from thence wander in bold lines over mountain and valley?! For in reality, without positive grounds, there is no starting point and without a more extended knowledge based on reliable evidence there is no acceptable line to be drawn — naturally not in a mathematical but in a migratory sense. Surely it requires an enviable courage to draw from the district of Lingah, on the eastern shore of the Persian Golf, or from Ras Osmara, on the same coast, and from Bagdad, a line over Behring-Straits, and to name it, as QUINET did, „volée" (flight), to say nothing of the sharp crossing of the lines of QUINET and DIXON on the one side and those of MENZBIER on the other! What real grounds can there be for such a line — ornithological migratory route — as QUINET has drawn from Bombay over the Gauri-Sankar to Pekin?

The chart, by showing the contrasts, must act automatically on the authors, or at all events induce them to prove the inductive correctness of their point of view or abandon the same.

If we take a strict view of those Migration-routes, which are most likely to cross the northern half of the eastern Hemisphere, it must at once become apparent that PALMÉN's frequently, and

so bitterly assailed „Netz“ * is after all induced in his own way, not phaenologically but „faunistically“. Corresponding to the species he chose, the Migration of which he described on the base of ornithological observations, the routes lead mostly to the margin of or along water. In this way PALMÉN in general avoided the difficulty of making his routes go through districts which no Ornithologist has visited and of which we posses no phaenological data at all, as unfortunately is the case with DIXON's** and QUINET's maps.

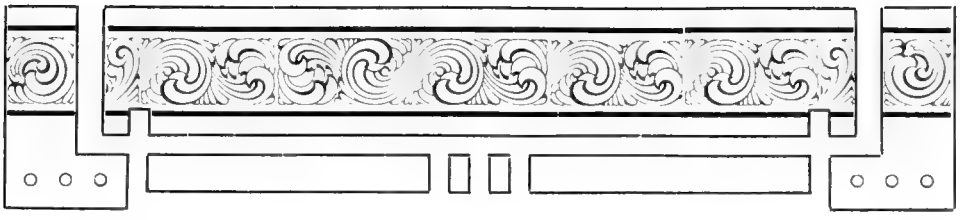
But in order that this „critical and automatic review“ may render complete service, also for myself and the H. C. O, I append in two groups a summary of the *Theses induced* by us, as well as those gathered from Literature, beginning with the sayings of the EMPEROR FREDERIC II. This review is not exhaustive, but it will contain all that is especially characteristic; and that will suffice.

* Net, system of routes.

** One of his lines is drawn over Agram—Servia, where in 1895 no observations were made at all.

# THESES.

## I. INDUCTIVE THESES; THE RESULTS OF THE WORK OF THE HUNGARIAN CENTRAL OFFICE OF ORNITHOLOGY.



## OTTO HERMAN.

1. All that has been designated „mystery“ or „riddle“ in connection with the Migration of Birds, is, in point of fact, only a want of inductive and positive knowledge, and nothing but the neglect of a proper division of labour in cases where the individual alone cannot attain the aim.

2. The observation and its elaboration divides into three organically connected parts:

I. *the Migratory:* progress of Migration;

II. *the Phaenological:* connection with Meteorology;

III. *the Biological:* causal impulse.

3. Parallel to the oscillating movement of Migration — generally from North to South and vicê-versa — goes the sexual impulse and its periodical development and retrogression, which, consequently, has an essential influence on Migration. The attendance of sexually immature individuals belongs to the physiology of masses.

4. In consequence of the power of flight, Birds find their way, without special organs, otherwise than animals fixed to the ground.

5. The lower the altitude of the locality, the earlier the arrival.

6. The higher the altitude of the locality, the later the arrival.

7. The more southerly the locality, the earlier the arrival.

8. The more northerly the locality, the later the arrival.

9. The lower the altitude of the locality, the later the departure.

10. The higher the altitude of the locality, the earlier the departure.

11. The more southerly the locality, the later the departure.

12. The more northerly the locality, the earlier the departure.

13. Latitudes and longitudes, as regards the Phenomena of Migration, are generally congruent, in the sense that the higher the northern latitude and the higher the locality, the later the arrival and vicê-versa.

14. The progress of Migration is generally isothermal, and is in consequence independent of the power of flight of the migrating species.

15. The question „Migration-route or movement in a broad front", is incorrectly formulated. Passing Birds follow constant directions, therefore certain routes; in settling the breeding area or breeding zone the result is expansion in the form of repletion.

16. The settling or colonization in the breeding quarters — much influenced by sexual excitation — a priori excludes a movement in the sense of isepipteses, as well as isotherms and isohypsals.

17. The settling of the breeding region goes on by tribes.* Between tribes of the same species there is often a large interval according to local features of the region.

18. One and the same species settles often in comparatively southerly or high northerly countries, resulting in a successive arrival, passage and departure.

19. On the way from the breeding places to winterquarters, or vicê-versa, tribes from various settlements of the same species meet and travel in company, and on reaching their places of breeding or hiber-

* Tribe = (Stamm), means the totality of individuals of a species which settle in a certain district.

nation, the masses disperse, according to the topographical situation of these places.

20. Many observers took the branching-off of the tribes from the main direction for the original direction of Migration, thus causing flagrant contradiction.

21. The non-observation of these branchings-off, their conception as original directions, and finally their being ideally lengthened in entering them on the maps, led to diametrically opposed ideas in regard to the cartographical routes of migration or their direction.

22. Tribes keep together in joining a body of migrants.

23. Upon the territorial range of the tribes is based the subspecific difference, as far as recognizable within the limits of differentiation.

## Concrete cases.

24. The migratory conduct of Anthus cervinus („Aquila" VI) proves the migration in tribes, as well as the tribal distribution in the hibernating region. Southerly range from Borneo to Algeria, northerly from Kamtchatka to Western-Finmark. Eastern and western form of the species is subspecifically distinguishable.

25. The Swallow (Hirundo rustica) settles in Europe, reckoned from Gibraltar to Luleå, in 105 days.

Arrival in Gibraltar lat. 30° 10 N. — 13. of February.*

Arrival in Luleå lat. 65° N. — 29. of May.**

The young swallows in Gibraltar are already fledged, when the old ones arrive at Luleå. This proves indisputably that settling does *not* depend on the *power of flight.*

26 HOWARD L. IRBY (ibid.) observed at that the time when the Swallows were already settled in Gibraltar, during 70 days — from the 13th of February to the 24th of April — others passed northward, no doubt

* Irby, Howard L: „The Ornithology of the Straits of Gibraltar" London 1895.

** Nordlinder in litt. Series

such as departed later (cf. also Andersen in „Aquila“ X). This shows a Migration in tribes, and also tribal distribution.

27. According to EMIN PASCHA's observations at Lado—Africa lat. 5° 2′ 0 N. long. 50° 0′ 0 E. fr. Ferro. — Hirundo rustica leaves on an average on the 20th of March, therefore 35 days later, than she arrives at Gibraltar (v. above) — a direct proof that the Swallows hibernating at Lado are destined for other northern regions.

28. In the Forrester's house on the Hági in the Tátra — 1000 Metres a. s. l. — Hirundo rustica arrives about the 5th of May, thus 28 days later than the average for the whole country (Hungary), taken on 10,000 dates: 7. of April: HEGYFOKY.

On Hideghavas – 1320 Metres — the Swallow arrives on the 13th of May, therefore 36 days later than the average, and from 61 to 69 days later than the earliest date of arrival: the 5th of March 1898: DE GAAL.

29. That Birds living in the extreme North leave their winter-quarters comparatively late, is proved by the following observations:

Africa, Cape Blanco — lat 20° 0′ N., long 1° 0′ E. fr. Ferro: Sterna macroura, Strepsilas interpres, Calidris arenaria, Tringa canutus and Tringa minuta were still noticed between 6th and 10th of May (DE SCHÄCK etc.).

30. The facts that migratory Birds leave us in the fall, whereas those in the South leave with the beginning of the rainy season, is already sufficient to prove the organic connexion between the Phenomena of Migration and the changes of weather. Observations and their working out must therefore be carried on in organic connexion.

31. Just as in Meteorology there are no two years absolutely alike, so it is in regard to Ornithophaenology. In both these branches of Science therefore, year by year, observation and methodical treatment is required as a „conditio sine qua non“.

32. Bird and Plant are phaenologicaly distinguished by the fact, that the first frees himself from the influence of weather, whereas the Plant is constantly subject to it.

33. Henceforward the systematical investigation of Bird-Migration has to consider also the hibernating regions and their peculiarities, in order to balance the knowledge in the breeding regions with those in the wintering regions: a condition necessary for understanding the whole Phenomenon.

34. A better knowledge of Bird-Migration depends in the first place on a methodical working out of the whole chronicled material gathered from all regions; further on the establishment of a uniformly working system of observation, extending, for the present, all over Europe.

35. Without *interzonal* observations there is no plausible answer to the general progress of Migration.

36. Only after having gained a sufficient knowledge of the whole Phenomenon, with its constant deviations, according to species and region, can we begin to give it a deeper biological foundation.

37. All errors, contradictions and imperfections in the question of the progress of Bird-Migration result from the following causes:

*a*) That the matter has been treated speculatively, whereas it ought to be treated by a merely inductive method.

*b*) That from few data, which though inductive, are after all only local, too general conclusions have been drawn.

*c*) That too great importance has been assigned to only pretending „Authority".

*d*) That dilettantism played too great a part in the matter.

*e*) That methodical work was avoided, instead of which uncritical compilations were considered sufficient.

## GASTON GAAL DE GYULA.

„Among the factors to be taken into consideration in the observation of Bird-Migration, only operations based upon average figures promise positive results". („Aquila" VII. 1900. pp. 370—377.)

„A critical control of the data of migration is indispensable; the mean figure is to be gained from the average data of several years' observations in a certain region".

„Average figures — mathematical treatment — give a more accurate result than mean figures— geometrical treatment". („Aquila" VII. 1900. pp. 358, 359.)

„As a foundation for working out comparative international material on Bird-Migration the geographical-chronological method — zonal-system — is most appropriate". („Aquila" IV. 1897. pp. 45—47.)

Under the name of „Quadrat-System", this system is extensively explained in: „Aquila" VII. 1900. pp. 13, 14, 371.

„Between „extravillan"* and „intravillan" data there exists undoubtedly a temporal difference". („Aquila", taken from all registrations.)

„Delay towards the North varies more or less, but can be proved for every species from year to year". (Taken from all registrations.)

„The *main-direction* in the spring movement in Hungary is therefore northerly. In certain parts however a deviation is observable, e. g. in the case of the Stork (Ciconia ciconia), which in the eastern half of Hungary moves from S. E. to N. W. — whereas in the big plain of the Alföld and in the western part of the country the direction is from S. W. to N. E.; the main direction however remains a northward one." („Aquila" III. 1896. p. 69. and IV. 1897. p. 64.)

„The assertion that migrating species, *without* exception, are obliged to avoid high mountain-chains, has been refuted by the Hungarian data" („Aquila" III. 1896. p. 74. — Since confirmed for Ciconia ciconia and other species by ERTL.)

„In some species not the „first appearance", but the date of the arrival of the main body — Culmination — gives a more uniform view of the movement." („Aquila" III. 1896. pp. 60. 61. Alauda arvensis).

* „Extravillan" means the outskirts of a borough, „intravillan" the inhabited parts of it; the first has always earlier dates of arrival.

„After a mild winter the spring movement generally takes place earlier". („Aquila" II. 1895. p. 74.)

„A severe winter retards the spring-movement." („Aquila" III. 1896. p. 113.)

„The stock of arrival-data, as collected by means of our observation-stations, cannot be considered throughout as „Migration-data-stock", but is more a mixture of Migration- and Distribution-Phenomena, the latter prevailing." („Aquila" VII. 1900. p. 362.)

„Consequently this Phenomenon, as far as we are able to perceive it by our senses, is not so much a characteristic of Migration, as rather a Phenomenon of distribution and repletion. The precise separation of both these elements, as far as possible, must be one of the chief objects in further investigations." (ibid.)

„In carefully observed species it is impossible to connect the dates of arrival by Isepipteses or other curves." („Aquila" VII. 1900. pp. 366, 370.)

„Supported by the data of a few but well-observed species we may expect to obtain better results in further observations on Migration." („Aquila" II. 1895. p. 80., VII. 1900. p. 371.)

„With regard to Hirundo rustica in Hungary one cannot speak either of „Migration-routes" or of „front-migration", but only of a gradual settling in the breeding area, resembling the work of a sower". („Aquila' VII. 1900. p. p. 360—370 and II Taf. XXX.)

This refers of course to the Swallows breeding in our vicinity and not to those passing to more northern regions. Cf. the observations of HOWARD IRBY at Gibraltar (v. OTTO HERMAN. 26.)

Altitude has a marked retarding influence, on every species. (Total, result from the regions* of OTTO HERMAN.)

* Hungary is orographically divided into four Migration-regions, each characterised by its dates for arrival: I. Plains: earliest; II. Transdanubian district: somewhat later; III. Eastern elevation: later than II ; IV. Northern elevation: latest.

„Subalpine stations have the latest dates, without regard to geographical position". („Aquila" VII. 1900. p. 365.)

„The whole settling needs a comparatively long period — in the case of Hirundo rustica it varies from 60 to 70 days": *oscillation.* („Aquila" VII. 1900. p. 363.)

„The *oscillation* therefore is also a biological symptom and does not result solely from erroneous observations". („Aquila" VII. p. 363.)

„The general oscillation in the course of the settling can be proved even in the smallest area from one village to another, and shows that neither phenological, nor geographical, but *only biological* factors are the cause" of it.

## JAKOB HEGYFOKY:

Progress in the department of Bird-Migration.

According to ten years' data (1890/91, 1894/1901), comprising 10,053 cases, the Swallow (Hirundo rustica) arrived in Hungary on the 7th of April.

The temperature of April 7th, according to 24 hours' reading at sea-level, and based upon 45 years' observations of seven stations, was 9·9° C, and that on a spot of the country which is geographically determined by 47° 1′ N. L. and 37° 2′ E. L. from Ferro. (The years 1890 and 1891 yielded as mean day of arrival the 4·9th of April and a mean temperature of 9·4 C°. „Aquila" II. p. 128, 136.)

The 10,053 data of arrival divide into 13 Pentades* (between March 7—11 and May 6—10). In the beginning only a few data are noticed, then they get more and more numerous, till they reach culmination between April 6—10 (with 25.3 percent); after this they become scarcer. The same results as in the case of the Swallow were gained in that of 13 other species of Birds. („Aquila" X. p. 196.)

* „Pentade" is a period of 5 to 6 days, into which the Migration-period is divided, in order to be able to compare or rather to determine even smaller parts of time.

Six pentades before the culmination show 41·5, the six after the culmination 33·2% of all data; the arrivals before the culmination are therefore much more numerous than afterwards.

An elevation of 100 metres shows a delay in the arrival of the Swallows of about 3 days (3·03), in departing an earlier start in the higher region of about 0·7 days than in the lower ones. („Aquila" II pp. 131, 148.)

Every geographical degree northward delays the arrival of the Swallow for about 1·17 day. (Természettudományi Közlöny, Ann. 1901. p. 292). Temperature also sinks faster on every kilometre upwards than from South to North.

The earlier the Swallow shows its appearance in a place, the shorter is the interval between the arrival and the settling for reproduction (Term. Közl. Ann. 1901. p. 294). Early comers therefore seldom remain.

Low atmospheric pressure, depression, very often shows the greatest rate in the arrival of the Swallow („Aquila" VII. p. 390 and IX. pag. 47).

If there is a centre of depression west of Hungary and if its path is directed to north or north-east, Swallows make their appearance in crowds. („Aquila" IX. p. 48 and 68).

The fair side of the depression, with its warm, southerly winds, is therefore favourable to the arrival.

In the same way the fair side of the depression accelerates the arrival of: Cuculus canorus, Alauda alauda, Columba oenas, Sturnus sturnus, Vanellus vanellus, Motacilla alba, Scolopax rusticola, Ciconia ciconia, Upupa epops, Chelidonaria urbica, Turtur turtur, Oriolus oriolus Coturnix coturnix. („Aquila" IX. p. 78 and X. p. 193.)

The other part of the depression — the bad side — with its cool, northerly winds, causes delay in the arrival of the Swallow and the 13 species mentioned („Aquila" IX. p. 59 and X. p. 193). Generally speaking, positive deviation from normal temperature has an accelera-

ting, negative deviation a retarding effect on the arrival. („Aquila" IV. p. 194.)

This was proved also by the departure „en masse" of the Swallows, after a strong negative deviation from the average, when the temperature suddenly fell to about $+5^{\circ}$, whereas the temperature on the surface of the earth might have been as low as $0^{\circ}$, („Aquila" III. p. p. 145, 149 and „Wetterbericht zum Wegzug 1898".)

The European depressions extend their sphere of action often as far as North-Africa and thus our birds can easily arrive with the southerly aircurrents prevailing on their fair side. („Aquila" X, p. 194.)

Data of arrival regarding earlier arriving species extends over a longer space of time, than that of later comers; consequently culmination develops better with the later, than with earlier comers. The Phenomenon of arrival is effectuated, therefore, more slowly in the case of earlier arrivals, than with the later arriving species. („Aquila" IV. p. 4.; X. p. 195).

The oscillation in arrival is more marked by the earlier arriving, than by the later arriving species, no matter whether the oscillation is judged according to the interval between two extreme dates, or according to the mean deviation of a single year from the mean of many years. This refers not only to Hungary (Ghymes), but also to Pommerania (Schloss Kämpen near Köslin), Livonia (Dorpat), Esthonia (Hellenorm) and South Russia (Kiew). In 6 species of early arrival the absolute oscilation is 39, in 8 later arriving species 21 days; the average deviation in the former species is $\pm$ 7·8, in the later $\pm$ 4·2 days. (Term. Közl. Ann. 1900 p. 91).

The average deviation in the same species in different and far distant localities seems to be a constant quantity. The latter amounts in the case of the Swallow, observed in 9 places (between 46 to 65° N. Lat.), to $\pm$ 3·5 — 4·8 days. (Term. Közl. Ann. 1900. p. 88.).

The oscillation in the earlier arriving species is greater than in the later arriving species on account of the variation in temperature, because

in the former case the temperature varies in degrees below and above 0°, whereas in the latter it varies only in degrees above 0°. (Term. Közl. Ann. 1900. p 89.) Prominent oscillations in temperature and arrival run parallel and vice versa. („Aquila" IV. p. 7.)

In Hungary Birds arrive earlier in the large plains than in other parts of the country, the difference according to 3 years observations of 14 species being about 7·4 days. This is caused by climatic conditions, which in spring are most favourable on the vast lowlands. („Aquila" X. p. 198.)

## On Method.

In regard to future observations HEGYFOKY recommends the following points.

1. In working out data of Migration only the simultaneous ones are to be used as a basis to calculate the average.

2. In long series of observations it is necessary to examine the average of shorter periods, Lustres and Decennaries, with regard to their accuracy and variation, otherwise it would be impossible to use for comparison the average of observations that are not simultaneous.

3. Even single dates are valuable, because they are adaptable for correcting errors in the series.

4. In publications the year should stand first; the species ought to be arranged alphabetically.

5. The average of a period should be calculated from the total data of one period; the earliest arrival should be marked: ⁂; the latest +, or with conspicuous letters. If the number of data is very bulky, pentaderates should be established, in order to determine precisely the beginning, culmination and end.

6. There should be 4 to 6 stations for observation of as many species as possible, besides numerous stations for observations of a few specially characteristic species. The localities should be published alphabetically.

7. With regard to the 6 stations mentioned first, as well as the geographical coordinates, international regulations are necessary.

8. Only simultaneous phenological and meteorological data are to be employed for comparative treatment.

## JULIUS PUNGUR.

According to the present state of the work based upon the vast observations of the autumnal passage of Hirundo rustica, in 1898, (2345 reports), the results are as follows:

1. In contrast to the spring-migration the autumnal migration leads from North to South; its course is less marked than in spring.

2. Corresponding with the successive populating of a region in the spring migration, a successive depopulation takes place in autumn.

3. The more or less delaying or accelerating finds its most decided expression in the regions. (Cf. ant. p. 25. Note.)

4. The real departure „en masse" lasted from 4th August to the first of October, i. e. 59 days.

5. From the beginning of the earliest departure — August 4th — till the last noticed Swallow — November 4th — 93 days elapsed. (Vide: „Aquila" XI. 1904.).

# II. THESES TAKEN FROM LITERATURE. (CHRONOLOGICAL.)

(Vide: „Aquila“ VI. 1899.)

EMPEROR FREDERIC II. (1194—1250) „De arte venandi cum Avibus“ Editio Schneider 1788. (Vide: „Rhea“ II. 1849. Thienemann, Leipzig.)

1. Birds migrate from colder regions to warmer and vicê-versa — passagium et reditus.
2. Only perfectly-feathered individuals migrate.
3. Not all Birds are Birds of Passage.
4. Birds of all orders migrate, but not all to very distant countries.
5. Some only move from the mountains into the valleys and vice versa.
6. Migration is caused by:
   *a)* Change of temperature; and in connexion therewith
   *b)* Exigencies of subsistence.
7. Young Birds, when strong enough, prepare for Migration, gather and meet at various places.
8. Each species always meets separately.
9. Birds become aware of Migration-time by a power of foresight and sensitiveness to cold and warmth.

10. Weather influences Migration.
11. Contrary winds, showers or hail hinder the movement.
12. Birds that are not yet quite strong enough for flight commence the journey earlier, the stronger ones later.
13. Land-Birds travel without distinct order; others in two convergent lines, one of which is always longer.
14. The leader has to work hardest, but is relieved by others.
15. Birds wander from the North, as far as their range goes, to countries where they find food

LINNÉ, Carl: „Dissertatio migratione Avium" Upsaliae 1757.

1. Nutriment and temperature.
2. The Migration is directed to unknown regions.

JENNER, E.: „Some observations on the migration of birds" 1824.

1. Breeding and in connection therewith more need of food.

FABER, Friedrich: „Über das Leben der hochnordischen Vögel" 1826.

1. Birds have an impulse for wandering and homing.
2. Mild winters effect acceleration of the spring migration.
3. Young Birds in the autumnal migration seldom travel in company with the old ones and, as a rule, later.
4. The species change quarters with different winds.
5. Originally every species was sedentary; Migration originated from extension of the limits of the species.
6. Causes: Instinct of migration, homing faculty, temperature and nourishment.

BREHM, Ch. L.: „Der Zug der Vögel." Oken's „Isis" 1828 p. 912.

1. The gipsy habits in Birds have to be considered in judging Migration critically.
2. The previous winter has great influence on the movement.
3. Weather during the passage has a great influence.
4. There are Birds migrating by day, others by night.
5. Birds travel at great heights and
6. against the wind.

7. Some Birds wander on foot, others swim.
8. The migrating direction is S. W. to N. E.
9. Coastlines and courses of rivers influence the direction.
10. Young ones do not follow the routes of the old ones.
11. Females migrate farther south.
12. Birds follow certain high-roads of Migration.
13. A certain quartering system is observed by wandering Birds.
14. The cause of the Phenomenon of Migration is a faculty of presentiment by which Birds foresee weather.
15. The Phenomenon is not to be explained either by want of food or currents of air.
16. Bird-Migration can be utilized for exact weather-prognostication.

ECKSTRÖM C. A.: „Zerstreute Bemerkungen über schwedische Zugvögel". Oken's „Isis" 1829.

1. Neither food, nor temperature, but only instinct intensified by experience and memory, are the causes.

POGGENDORF: „Annalen der Physik und Chemie" 1833.

1. Food, temperature and sexual instinct.

BREHM, Ch. L.: Der Zug der Vögel. „Naumannia" 1855.

Cause: a wonderful faculty of presentiment.

NAUMANN, I. F.: „Über den Vogelzug mit besonderer Hinsicht auf Helgoland". Rhea I. 1846. p. 18 u. ff.

1. There are certain routes which Birds find even when wandering at night.
2. There must be highways of Migration frequented every year by migrating Birds.
3. Along the routes of Migration there are certain places of rest.
4. The direction — in Helgoland — is East-West, sometimes with slight deviation, also South-North.
5. Temperature, wind and weather are of great importance.
6. Migrating Birds turn aside from large obstacles.

7. Birds are afraid of crossing the open sea; they either take a roundabout way or follow directions offering resting-places — Helgoland, Capri.

KESSLER: „Einige Beiträge zur Wandergeschichte der Zugvögel" Mosc. Bull. 1853.

1. There are summer-birds, winter-birds and periodically wandering birds.
2. Migrants which arrive earliest, remain longest, those arriving latest generally leave earliest.
3. Summer- and winter guests often meet in the same place.
4. Weather has great influence upon Migration.
5. The arrival of Birds of passage and of winter guests seems to depend upon the weather in their northern home.
6. The order in which the species arrive in various localities is not always the same.
7. The advance is very unequal, in some species quicker, in others slower.
8. The oscillations are stronger in the South, than in the North.
9. Some species seem to migrate from S. W. to N. E., others from S. to N. The Migration-direction is not always from S. to N. but when crossing rivers also from S. W. to N. E.
10. Migrating Birds rarely follow distinct routes, but advance, pretty uniformly along the whole extent of the front (broad front).
11. Birds have no presentiment of weather.
12. Oscillation in early comers is more marked.

## On Method.

Only observations continued for years in as close a system as possible, can give positive results.

MIDDENDORFF, A. von: „Die Isepiptesen Russlands etc." 1885. Extra-copy from Mém. de l'Acad. des Sciences, St. Pétersbourg.

1. It seems plausible that Birds follow distinct Migration-routes.
2. Birds do not travel with full speed, but cover daily only comparatively short distances.
3. Considerable elevation above sea-level delays.
4. Regarding time of arrival, the greater or lesser distance from the winter-quarters is of no little importance.
5. Near the Arctic circle early and late Migrants often arrive nearly simultaneously.
6. First comers — early arriving Birds — are always more unsteady than late comers.
7. Length and severity of the previous winter have evidently an influence on the arrival.
8. The innermost essence of the Migration-Phenomenon is at present still a Problem, not wholly decipherable by climatical, magnetic and similar influences.

### On Method.

9. We require as close an observation-system as possible, in connexion with meteorological observation.
10. Knowledge of the average time of arrival is necessary.
11. To ascertain averages 50 years are required.
12. To obtain an intuitive view of Bird-Migration it is advisable to construct Isepipteses; they are not coincident with Isotheres but approach Isochimenes.

KJAERBÖLLING: „Förhandl. vid de Skand. Naturforssjette möte". Stockholm 1885.

1. The outlines of the Eastern-sea and the situation of islands have an influence upon migration.
2. Wind and weather have great influence upon migration.

HIERONYMUS, DR.: „Über das periodische Verschwinden vieler Vögel zur Herbstzeit". Cabanis' Journ f. Orn. 1857.

1. High mountains deflect the migration route.

BÜTTNER G. J.: „Aphorismen über die Wanderungen der Vögel" „Naumannia" 1858.

1. Migration originates from an indefinable instinct.

BREHM, A. E.: „Das Leben der Vögel" 1861.

1. The Migration-direction is southwesterly and vicê-versa.
2. Streams and valleys are the highways of Migration.
3. Deep ridges when in the direction of large valleys, are passages.
4. Cause of migration: love and hunger.

HEUGLIN, TH. von: „Zoogeographische Skizze des Nilgebietes" „Petermann's geogr. Mitth." 1869.

1. The migratory Birds of Europe and Northern Asia wander as far as Central-Africa.
2. The Migration-direction is N. S.
3. Coasts and streams are readily followed by Migrants.

MIDDENDORF, A. von: „Sibirische Reise" Tom. IV. 1873—74.

1. There are Migration-routes, which follow the geographical latitudes.
2. There are Migration-routes, which follow the geographical longitudes.

PALMÉN, I. A: „Über die Zugstrassen der Vögel" Leipzig 1876. („Om foglarner flyttningswägar" 1874.).

1. Migration is a Phenomenon of movement.
2. Two moments have to be taken into consideration, the time-moment — migration-season — and the space-moment migration-route.
3. Birds migrate from their northern breeding stations to the southern ones along certain geographically fixed routes.
4. As a rule Birds do not migrate beside or between the routes.
5. Migration-routes, as a rule, run separately or at most meet only at the final point.
6. The individuals return in spring along the same Migration-route as they travelled in autumn.

7. An interchange of individuals does not take place on the route.
8. Over unfavourable districts Birds pass without break.
9. The total number of the individuals depends on the frequency of the species at the starting point and on the nature of the route.
10. Most of the Birds do not fall under the same category for the breeding-season as for Migration.
11. The departure may be simultaneous; in the procession the individuals have the same rank, as in the breeding-zone: successive migration; or the northern ones set out earlier: passage.
12. Hereditary organisation makes Migration possible, but does not cause it.
13. The migratory instinct depends partly on bodily, partly on traditional heredity.
14. The knowledge of the Migration-routes becomes traditional with the species.
15. The beginning of Migration originates in irregular passing.
16. The appearance of stragglers is the result of Migration departing from the routes.
17. If stragglers breed in strange countries, the geographical limits of the species are extended; regular Migrations leave them as they are.
18. This phenomenon explaines abbreviated and protracted migration.
19. Migration-routes may also give an impulse to evolution of forms; such arise from irregular Migration.

## On Method.

20. Dates of arrival scarcely give sure results, they are most critical to work up.
21. Dates from different places are only commensurable, if they are of the same year.
22. A typical series is a uninterrupted series of epochs drawn from mean data.

SEVERTZOW N. DR.: „Études sur le passage des oiseaux dans l'Asie-Centrale, 1875.

1. Every species travels along its own route.
2. On the way Birds stop at quite inappropriate places.
3. Migration-routes are strips of land, where Birds appear in greater numbers than in the intervening tracts.
4. All routes are characterized by crowds of first passers which neither nidificate nor hibernate.
5. Alpine Birds do not migrate, but pass into the valleys.
6. East of Khanghai the entire passage is directed to China.
7. The migration-routes, which are close together in Central-Asia, branch off in the north and also cross each other.

WALLACE, R. A: „Die geographische Verbreitung der Thiere" 1876.

1. Weather has no essential influence on Migration
2. The oscillation in the spring-migration amounts only to 14 days.
3. Old Birds wander farther south than young ones.
4. Migration dates from a period, when the Mediterranean Sea did not exist.
5. The Mediterranean is passed only at certain points: Gibraltar, Sicily, Malta, Ionian Islands.

WEISSMANN, AUG: „Über das Wandern der Vögel" Samml gem. wissensch Vorträge, herausgegeben von Rud. Virchow und Friedr. von Holzendorff, Berlin 1878. Ser. XIII, Heft 291.

1. The nature of the phenomenon of Migration is already known.
2. Birds of Migration are influenced by an impulse, which originates from passing (roving) — imperfect migration.
3. Only such birds migrate as cannot exist without change of place.
4. Birds are taught to wander; troops migrate under the guidance of old experienced Birds, which fly at the head of the procession.
5. Birds follow distinct Migration-routes. These migration roads are the old routes by which they spread northward.

6. The crossing of the Mediterranean at certain points dates from a geological period, when the Mediterranean was divided by land into several basins.
7. Birds are hereditarily gifted in a high degree with a sense of orientation; they direct their wanderings to places already known to them.
8. Migrating Birds know all the pecularities of the route and never leave it voluntarily.
9. Migrating Birds have a fine sense for observation, sharp eyes and an excellent local memory increased by experience.
10. Migration originated, in the fact that birds settled also in countries which yield food only during part of the year.
11. Settling took place only gradually from South to North, especially since the glacial period.
12. In the course of the slow advance of the species the necessary qualities for Migration itself — Passage — developed gradually to greater perfection

HOMEYER, E. von: „Die Wanderungen der Vögel mit Rücksicht auf die Züge der Säugethiere, Fische und Insecten" 1881.

1. Birds do not wander along distinct, sharply defined routes, but disperse uniformly, fanlike, over extensive regions.
2. Birds migrate essentially with the wind.
3. Birds possess a certain presentiment for weather.
4. Most of the small birds are crepuscular wanderers, the large ones day-, and strand-birds nocturnal wanderers.
5. Migration generally goes on at a great height.
6. The Migration procession of each species divides itself into vanguard, main body and rear-guard.
7. Young and old Birds, sometimes also the sexes, migrate separately.
8. Guidance does not exist.
9. Only invincible obstacles cause deviation or crowding.

10. After the main-movement no backward movement occurs.
11. There are regular and irregular resting-stations.
12. Migration is essentially influenced by weather. (Cf. 3.)
13. In countries having the same climate, Birds arrive nearly simultaneously.
14. The impulse of Migration is hereditary, not gained by training.
15. Before starting, many species assemble at certain meeting-places.
16. Wander-Birds always return to the same place.
17. Birds have a strong sense for locality and direction
18. Fundamental causes of Migration:
    *a*) Warmth and currents of air;
    *b*) Light;
    *c*) Food;
    *d*) Propagation and homing instinct;
    *e*) Sociableness.
19. Data of arrival and departure alone are insufficient to solve the problem; an exact knowledge of all constant and local varieties is wanted for this purpose.
20. Immigration or advance of certain species does not exist.
21. Straggling guests are badly observed species, so to say a fiction.
22. The direction of Migration is not everywhere the same.
23. In normal years the oscillation is trifling.
24. The breeding-region is the real home of the species.
25. All species undertake reconnoitring trips, to find out suitable breeding places.
26. Species which form constant local varieties, are most suited for observation.
27. Wandering by walking or swimming does not take place.

PARKER, H.: „Observations on Early Nidification and Migration in North-west Ceylon". Ibis 1883. p. 197.

1. Time and place of nidification are determined by the food-supply and the feeling of security, and not by weather or climate.

2 The cause of Migration is the search for plentiful food.

3 A period of 2000 years is sufficient to establish Migration.

4. There are some exceptions to Mr. Seebohm's law that „every bird breeds in the coldest regions of its Migrations". („Sibérie en Europe" p. 244.)

5. The country in which a migratory bird breeds is not necessarily the home of the species.

HARTWIG: „Zum Vogelzuge". Journ. f. Ornith. 1885.

1. Almost the chief reason is food; temperature and light are of minor influence.

MENZBIER, M.: „Die Zugstrassen der Vögel im europäischen Russland". Bull. de la Soc. Imp. des Nat. de Moscou" Ann. 1886. No 2.

1. Only two large Categories of Migration-routes can be accepted: viae marinae littorales — and: viae subcontinentales; viae submarinae littorales signify a transitory category.

2. Every species travels its own way; what Biologists call Migration-routes are only the coincidence of the routes of several species for a shorter or longer distance.

3. The Phenomenon of Migration is called forth by the conditions for the acquisition of food; the Migration-routes originate in the history of the range of the species and feeding and oro-hydrographical conditions.

4. The breeding-places have an influence on the Migration-routes of the species, but not exclusively and not for all species; for the majority of continental Birds a change in the breeding-places must be considered as a normal phenomenon.

5. The Migration-routes change in the course of time either in connexion with changes in the distribution of the species: or in connexion with changes in the oro-geographical character.

6. The routes of the autumn and spring Migration are not always the same; in some cases the difference between spring and autumn

migration along the same road is marked by the different number of migrating individuals.

7. In the phenomenon of migration no unimportant part is played by imitation, the chasing among different species, the assembling in herds of young birds, the similarity of colour etc.
8. The inherited knowledge of the Migration-routes and the experience gained by the successive generations leads in some regions to a shortening of the original route, reducing the route to only determined directions of Migration.
9. The characteristic of the Migration-routes is determined not only by the migrating species, but also by the relaying of the summer- and winter-population, which is in connexion with the character of the country and the food-supply.
10. Changes in the food-supply produce also changes in the periodical appearance of Birds, for which the alteration of the migratory habits of a bird into sedentary ones may stand as an individual example.

TRISTRAM, H. B.: „The Polar Origin of Life considered in its bearing on the Distribution and Migration of Birds". Part II. Ibis 1888 p. 209.

1. All birds breed in the northernmost limits of their range.
2. Birds which penetrate furthest north for nidification, — whether species or individuals —, usually retire furthest south.
3. All northward Migration is undertaken for the purpose of nidification; the southward migration for food or warmth.
4. The lines of Migration are very different in the case of different species, and often intersect each other.
5. Birds which breed in the Tropics do not migrate, unless in the case of birds which ascend the mountains for nidification and descend to the plains in winter, as various Thrushes in the Andes, and numberless species in the Himalayas.

SEEBOHM, Henry: „The geographical distribution of the Charadriidae". (Preface) 1888.

1. In the Northern Hemisphere all migratory Birds breed on the northernmost limit of their range; except in the Southern Hemisphere, where every Bird breeds in a colder climate than that in which it lives during migration at other times.
2. The higher north Birds wander in summer, the farther south they go for hibernation.

GÄTKE, H.: „Die Vogelwarte Helgoland". Braunschweig 1891.

1. There is a spring Migration, characterized by:
   *a)* want of disposition for more convenient routes,
   *b)* want of inclination to make a halt,
   *c)* restlesness and haste to proceed:
   The cause is sexual instinct.
2. There is an autumn Migration, but without the characteristic features of spring Migration.
3. In both seasons the routes are not the same.
4. Under normal circumstances Migration is not observable.
5. Disturbing influences — weather — allow fragments of the Phenomenon to be observed.
6. The flight during Migration is rapid, up to 53 geographical miles an hour.
7. The flight in Migration can take place at an altitude of 25000 to 35000 feet.
8. Birds choose those layers of air which are most convenient for migration; as well as those currents of air which are most appropriate.
9. This shows great sensitiveness (v. 8).
10. Guidance by old individuals does not exist.
11. A separate Migration-order according to age exists, viz.
    *a)* in spring the old ones arrive first,
    *b)* in autumn young Birds commence Migration.
12. There are no Migration-routes but only Migration-directions.
13. Migration did not develop from either straggling movement, nor from heredity.

14. Birds act with a purpose and therefore instinctively.
15. The front of Migration corresponds to the breeding region.

MARTORELLI, Giacinto, Prof.: „Le mute regressive degl'Ucelli migranti etc." 1892.*

1. The ease with which birds are able to change locality, for which they are predestined in consequence of their bodily constitution, was the reason for Migration, which became regular and hereditary.
2. The fact that refrigeration in the Arctic regions lasted for centuries or a change caused through special glacial period had no doubt a powerful effect upon the distribution and differentiation of Birds.
3. Temperature has no decisive influence upon Migration: the latter is based upon the want of food and safety.
4. The number of species actually known as migratory Birds is so large, that Migration may be considered rather a rule than an exception.
5. Migration is not constant and is not uniform even with individuals of the same species.
6. The oscillations in Migration are in close connexion with the habits of birds and the localities haunted by them.
7. The colour in the majority of migratory Birds — at least in our Hemisphere — is either little different or becomes more striking only after arrival at the breeding places.
8. If there is a marked difference in colours between the sexes of the same species, the colour of mature males before leaving for winter-quarters is likely to be confused with that of immature males.
9. Birds breeding in one Hemisphere do not breed in the other, but pass over to the latter in the *second* summer.

* A diligent compilation.

10. Migration, owing to which birds enjoy the benefits of this two-fold summer, leads them from the Arctic regions to the southern parts of the Continents and vice versa.
11. Tropical Birds do not migrate at all, or only in a very limited degree.
12. The object of the greatest part of northward—bound Migrants is breeding; of those passing to the south, food, warmth and light.
13. The breeding place is not necessarily the original home of the species.
14. It is not always the breeding regions that have the coldest climate.
15. As a rule, species or individuals which migrate far to the North, migrate far south too.
16. It needs a long time for Migration to effect a differentiation of species; less time is sufficient to produce more or less modification of Migration.
17. Migrating companies of one and the same species may travel in various directions, the routes may even cross.
18. The sense of orientation is not infallible, but develops with age and improves.
19. The younger generation is guided by the old Birds, which know the route by experience.
20. If the younger ones by chance lose the proper route, they have much difficulty in finding it again, hence the fact that most of the stragglers are young Birds.

ANGOT, A.: „Annales du Bureau-Central Météorologique" Paris 1895.

1. Temperature is not an incentive to Migration.

NEWTON, A. PROF.: sets forth the hypothesis of over-crowding; arriving migrants replace those which had arrived before, there being no room for both in the same place (Cfr. Gätke: „Heligoland as an ornithol. observatory" 1895. p. 145 and the new „Naumann" ed. by Dr C. HENNICKE. Gera, part I. 1905 p. 101. and W. RUSKIN Butterfield „Remarks upon . . . Migration. of Birds". Nov. Zoological Vol. XII. 1905. p. 16.).

BRAUN, FRITZ: „Über die begriffliche Stellung des Striches zum Zugphaenomen" Ornith. Monatsberichte. VI. Nr. 12. 1898.

1. Passage is a local movement of the species in question in any direction of the compass and does not necessarily lead to regions with plenty of food.
2. Migrating Birds obey an impulse, which has developed in the course of thousands and hundreds of thousands of years. They take to flight before a scarcity of food expected to come sooner or later.
3. Most of the Birds which at present are birds of passage were formerly, in very remote times, most likely migrating. More and more accustomed to the circumstances in the new regions, they became birds of passage and gave up Migration. The breeding business at first was in collision with the instinct of migration, later however it became victorious and changed the migratory bird into one of passage
4. Migration and the instinct of propagation are closely connected.
5. The Birds changed from Birds of Migration into birds of passage; gradually produced, instead of one, two or even three breeds, from which it may be concluded that, the more breeding increases in extent, the more the instinct of Migration weakens.

BRAUN, FRITZ: „Der Vogelzug. I." Journ. f. Ornith. Nr. 4. October 1898.

1. The determination of as many Migration-routes as possible is no preliminary condition to explain the cause of the annual wanderings.
2. In the glacial period Birds lived in the Tropics. With the progress of a favourable temperature the Birds moved northward, began to breed and returned during winter time to the Tropics.
3. The experience of thousands of generations became instinct, which manifested itself with the same regularity as the breeding instinct. The force of the sexual instinct is according to its genesis, proportional to the necessity of migration.

4. The time of departure of our migrating Birds is in direct proportion to the specific kind of food, and in inverse ratio to the quantity of food required and to the ability of the species to get this supply of food.

BRAUN, FRITZ: „Der Vogelzug. II." Journ. f. Ornith. 1899 Nr. 1.

1. The homes of our Birds of Migration are not the countries where they sojourn in summer, but must be looked for in the southern regions (Cf. 2 in Part I.)
2. The migratory instinct is not even a specific part of propagation in Birds of Migration. (Cf. 4 in Part I.)
3. Migration and propagation belong to a higher unity, the whole belongs no more to the ideal world of an individual, but has hardened into an instinct of the species.
4. In our opinion the instinct of Migration has a very close connexion with propagation (Cf. 2. supra.).
5. The entire impulsive life of birds forms a whole, in the centre of which stands propagation and breeding. Breeding in its turn depends upon the need of food of the species in question, so that this is and remains the causal reason of Migration.*

DEICHLER, Christian: „Der Vogelzug. Bemerkungen zu den beiden gleichnamigen Artikeln von Fritz Braun". Journ. für Ornith. 1900. Nr. 1.

1. The breeding regions are the home of migratory Birds, therefore for ours Europe.
2. This is proved by the palaeontological discoveries in the basin of Paris, among them many recent forms like: Cypselus, Alcedo, Parus, Motacilla, Passer etc.
3. The tropical characters of some of our Birds originated in *pre*-glacial periods, when our regions still had a tropical climate.

* A further article „Noch einmal der Vogelzug" in: „Journ. für Ornith". 1900 Heft 2 directed against Deichler, is only contradictorily.

4. Migration began when after the tertiary age the glacial period set in; this compelled the birds to pass to the tropics, whence they returned in spring for breeding in those places which even during the glacial preriod remained free of ice.
5. In the course of time this to and fro movement became instinct, which acts independently of weather and food, and forces the birds to Migration, even when there is plenty of food still.

FINSCH, Dr. O. (in: „Notes from the Leyden Museum" XXII. 1900/1 p. p. 121—125.) „I direct attention to the strangest wandering instinct of one characteristic species of the southern Hemisphere, the long-tailed Cuckoo (Urodynamis taitiensis) and its geographical distribution. With the exception of a single case elsewhere (in New-Caledonia) this parasitic species is confined in its propagation to *New-Zealand,* being here a *regular summer visitor,* arriving at the beginning of October and leaving in February. Except in these months it is observed in various Islands of the Pacific as far north as the Carolines (Yap, Palau), as far east as the Marquesas, as far west as New-Caledonia (but strangely enough not yet in Australia or New-Guinea). The distribution therefore comprises nearly the whole of the Pacific, from North to South over 56 geographical degrees (= 840 geographical miles), from West to East over 86 degrees (= 1300 g. m.).

In contrast with all our Birds of Migration, which migrate for breeding from *South to North,* this species

1. wanders for propagation from *North to South;** 
2. as a rule not over land but, although not a good flier, chiefly over ocean;
3. not in company, but singly;

* The same as Chalcococcyx lucidus and Tanspiptera sylvia.

4. not forced by climatical influences, nor by want of food, nor by want of Birds serving as foster-parents (to hatch the eggs), as all these necessities of existence are to be found everywhere on the whole area of its tropical and subtropical distribution.
5. The reasons for the wandering habits of this Cuckoo are therefore only explicable by instinct, a relic of an inherited habit.
6. The facts inferred from the observations on this species are worth remembering by all „as reflecting on the mysteries of Bird-Migration."*

### a) Inductive Theses.

BARRINGTON, R. M.: „The Migration of Birds etc." London and Dublin 1901.

*For Ireland.*

1. Some species of migrating Birds are observed only in certain localities along the Irish coasts, which shows the existence of distinct migrating directions.
2. The majority of Birds of Migration arrive at a period of considerable evenness, which leads to the conclusion that, at their departure from Ireland, they arrive at the same time.
3. The departure is dependent upon the force, not upon the direction of wind.
4. The Migration direction is generally landward.
5. The first arrivals in spring are long-winged species; in autumn out of 14 cases there were 9. In autumn the long-winged males of Turdus merula depart first; the females last (errors with young Birds not excluded). Whether the young Birds depart before the old ones could not be ascertained.
6. Less powerful fliers migrate mostly by night, probably for safety's sake.

* Original contribution by Dr. O. Finsch.

7. During the dark phases of the moon many Birds, attracted by the light of Lighthouses or Lightships, perish by collision with the lanterns.
8. Migration by moonlight is not excluded, but then the light of Lighthouses is avoided.
9. The losses through Lighthouse-lanterns are most numerous in autumn, on account of the longer duration of the nights, and the much greater number of individuals, among which are many inexperienced ones.

LUCANUS, F. von: „Die Höhe des Wanderfluges auf Grund aeronautischer Beobachtungen". Journ. f. Ornith. 1902.

1. Birds of Migration generally pass lower than 1000 Metres relative height.
2. They always migrate below the lowest clouds.
3. Only within sight of land are Birds able to find the proper direction.
4. A very high altitude is unnecessary for Birds, because according to aeronautical observations at an altitude of above 1000 Metres the perspective (Fernsicht) lessens.

Before proceeding to group the Theses taken from Literature, I have to make somere marks on those of BARRINGTON. This author keeps strictly to positive data, and if, here and there, he does go in for conclusions, he is very cautious. His Theses are therefore inductive and in this respect valuable. However I cannot suppress one remark and that refers to the predominance of observations which are made on Lighthouses, not only by BARRINGTON but by the English in general and lately elsewhere too.

The proper meaning of paragraph 8 with BARINGTON is that the light of the Lighthouses attracts migrating Birds only on *dark* nights, but that migration by moonlight is not excluded; only the migrants *avoid the light of Lighthouses* and go on in their *own direction,* in which

the Lighthouse does not stand. The light of Lighthouses therefore has a *diverting* effect, and does not show the original direction, which seems very natural. I always think of the street-and garden-lamps, the light of which attracts various Insects sometimes in myriads, without showing us the true nature of their night-life. And therefore I am not sure, whether the great sacrifice of EAGLE CLARKE,* his voluntary exile on the Eddystone Lighthouse, to study the nightphases of Migration, has yielded absolute phaenological results? But even if it had the results are only of local importance.

Generally it is my firm opinion that all observations concerning England must be worked out methodically in their whole extent, in order to bring to light their hidden value. The „Reports on Migration" contain treasures of investigations from shore and Lighthouses, for which we are indebted to the zeal of such excellent men as HARVIE-BROWN, CORDEAUX, BARRINGTON, MORE and EAGLE-CLARKE, whose merits are for ever connected with Bird-Migration. It is not to be doubted that the right man will be found, to work up the whole material uniformly, an immense material, of which we get an idea when we think of the observations on Cuculus canorus in the MARSHAM-family.** And let us not forget DERHAM, the creator of Ornithophaenology, nearly two centuries ago! (Philos. Transactions London 1708). In working out all this material, we should get a very good history of observations on Bird Migration in the United Kingdom, a work of the greatest importance for all concerned in this most interesting branch of ornithological science.

Most likely there is still valuable material, which remains unpublished. The labels on thousands of Bird-skins in the British-Museum,

* „A month on the Eddystone: a Study in Bird Migration". Ibis for April 1902. And: Studies in Bird. migration II . . . at the Kentish-Knoch Lightship in the Autumn of 1903. Ibis 1904 p. 112—142. Tab. 4.

** From 1739 to 1810 and again from 1836—1840 and 1845 to 1904. Cf. Southwell: „Trans. Norf. and Norwich Nat. Soc." II. p. 31.

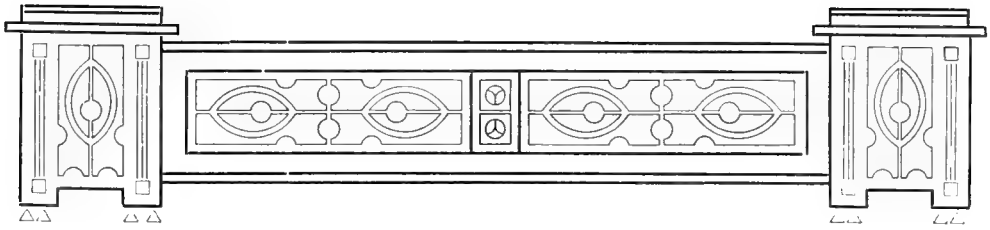
provided with day-data, contain a great treasure of ornithophaenological facts which, when brought to light, will throw light upon territories which could give us new fixed points, as EMIN PACHA's series from Lado.

No doubt a very big work, especially at the outset, and a hard trial for the patience of the workers, but the very first results will produce a magic effect, gradually growing with the discovery of more and more interesting facts.

With regard to the aeronautical observations published by VON LUCANUS, I am inclined to believe that the relative altitude of 1000 Metres is calculated rathertoo low. We know that Birds migrate also in day time, but in clear weather they are invisible, which even with smaller Birds could not be the case, if they did not wander much higher. On the other hand in dull weather, when the clouds are low, migrating Birds may be seen at once, a fact observed by myself and others (among them TITUS CSÖRGEY). We leave it undecided whether this low-flying serves for orientation, but generally in dull weather Migration stops. When the weather clears up again, even large masses of Migrants disappear as if blown away.

# RECENSIO CONTRADICTORIA.

IN ALPHABETICAL ORDER.



*Age and sex.* Travel often separately. GÄTKE 11. — Young Birds prepare themselves for Migration. EMPEROR FREDERIC II. 7. — Whether the young Birds depart before the old ones, could not be ascertained. BARINGTON. 5.

*Arrival.* In the Arctic regions early and late migrants arrive simultaneously. MIDDENDORFF. 5. — The seriatim arrival of the species in various localities is not always uniform. KESSLER 6. (This is *no* contradiction). — In regions of the same climate Birds arrive nearly simultaneously. HOMEYER. 13.

*Breeding place* (Cf. also „Original home" p. 96). Is not necessarily the original home of the species. PARKER. 5. — Is not necessarily the original home of the species. MARTORELLI. 13. — Is the home of the species. HOMEYER. 24. — Has no exclusive influence. MENZBIER 4. — Has influence upon Migration. GÄTKE 15.

*Breeding zone.* In the northern Hemisphere on the northernmost limit of the range. SEEBOHM. 1. — In the northern parts of the range of the species. TRISTRAM. 1. — Is not necessarily the coldest part of the Migration region. MARTORELLI. 14.

*Foresight.* In regard to weather. EMPEROR FREDERIC. 9. — Power to foresee weather. BREHM, CHR. L 14. — Bird Migration can be utilized for weather Prognosis. BREHM, CHR. L. 16. — Birds possess a certain presentiment of weather. HOMEYER. 3. — Birds have no presentiment of weather. KESSLER. 11. — Great sensibility. GÄTKE. 9.

*Guidance* by experienced individuals. — Exists. WEISSMANN. 4. Exists. MARTORELLI. 19. — Does not exist. GÄTKE. 10. — Does not exist. HOMEYER. 8.

*Immigration* or a movement to extend the range of certain species. — Does not exist. HOMEYER. 20. - Birds undertake certain reconnoitring trips. HOMEYER. 25.

Immigration has undoubtedly been observed. Zostorops lateralis (Lette) immigrated from Australia to New-Zealand; the settling of Serinus serinus in Silesia (valley of Hirschberg, Riesengebirge) was witnessed by myself. FINSCH (in litt.).

*Imperfect Migration* v. Straggling p. 97.

*Impulse.* — Birds of Migration are incented by an impulse, which originates from straggling — imperfect Migration. WEISSMANN. 2. — Migrating Birds follow an impulse which has arisen in the course of thousands and hundreds of thousands of year. BRAUN. 2. — A period of 2000 years has sufficed to firmly establish Migration. PARKER 3.

*Instinct.* — Birds act instinctively. GÄTKE. 14. — The migratory instinct depends partly on bodily, partly on traditional heredity. PALMÉN. 13. — Migration originates from an indefinable instinct. BÜTTNER. 1.

*Mediterranean.* — Migration originates in a period when the Mediterranean did not exist. WALLACE. 4. — The Mediterranean is passed only at certain points. WALLACE. 5. — The crossing of the Mediterranean at certain points dates from a geological period, when the Mediterranean was divided by land into several basins. WEISSMANN. 6.

*Meetingplaces.* — Young Birds meet at certain places before starting. EMPEROR FREDERIC. 7. — Each species always associates separately. EMPEROR FREDERIC. 8.

**Migration (Passage).**

*Altitude of:* Very high. BREHM CH. L 5. — HOMEYER. 5. — 25000 to 35000 feet. GÄTKE. 7. Generally lower than 1000 Metres. LUCANUS 1.

*Causes of:* — Hunger and love. BREHM A. E. 4. — Food. WEISMANN. 10 Quest for richer food. PARKER. 2. Food and safety. MARTORELLI. 3. — Alimentation. MENZBIER. 3. — Readiness to change the locality. MARTORELLI. 1. — Northward, breeding: southward, food. MARTORELLI. 12. — TRISTRAM. 3. — Change of temperature, subsistence. EMPEROR FREDERIC. 6. — Warmth, light, propagation, homing sense, sociableness, currents of air. HOMEYER. 18. — Not explicable by want of food or currents of air. BREHM CH. L. 15. Propagation and food. JENNER 1. Temperature, food, wandering instinct, homing faculty. FABER 1, 6. — Neither warmth nor want of food, but power to foresee weather. BREHM, CHR. L. 14, 15. — Neither nourishment nor temperature, but only instinct, augmented by unconscious experience. ERKSTRÖM. 1. — Food, temperature and sexual instinct. POGGENDORFF. 1. — A marvellous presentiment. BREHM, CHR. L. 1. — Temperature probably only, anyhow main cause. 1. Temperature no cause. ANGOT 1. Chief reason food. HARTWIG 1.

*Direction of:* — S. N.,—W. E., S. W.—N. E., E. N.—W. S. etc. Influence of coasts and streams. HEUGLIN. 3. — Influence of coasts and islands. KJAERBÖLLING. 1. Influence of rivers and valleys. BREHM, A. E. 2, 3. — Rivers are crossed. KESSLER. 9.

*Evolution of:* Migratory Birds originated from sedentary. FABER. 5. — Migration originated from straggling (imperfect Migration.) WEISS-

MANN. 2. — Straggling (imperfect Migration) sprang from Migration. BRAUN. 3. — Migration proper (Passage) developed from wandering. WEISSMANN. 12. — Migration originates from straggling (imperfect Migration). PALMÉN. 15. — Migration does not originate from strolling movement, nor from heredity. GÄTKE. 13. — Strolling guests do not exist. HOMEYER. 21. — The impulse of Migration is hereditary, not cultivated. HOMEYER. 21. (Cfr. Weissmann 12.) — Stragglers extend the limits of the species and may create new routes of Migration. PALMEN. 17. — Migration can give an impulse to the creation of new forms. PALMÉN 19. — The gipsy habits of Birds are important in Migration. BREHM, CH L. 1. — Birds of Migration may change into sedentary Birds, and vice versa, owing to conditions of food supply. MENZBIER. 10. — A period of 2000 years has sufficed for firmly establishing Migration. PARKER. 3. — It takes a long time before Migration causes a differentiation of species. MARTORELLI. 16. A rather short time is sufficient to produce modifications in Migration. MARTORELLI. 16.

*Flight* of: Extremely rapid. GÄTKE. 6. — Not with full speed. MIDDENDORFF. 2.

*Limits* of: Old birds migrate farther south than young ones. WALLACE. 3. — Females migrate farther south. BREHM, CH. L. 11. — The higher north Birds wander, the farther south they migrate for hibernation. SEEBOHM. 2. — TRISTRAM. 2. — MARTORELLI. 15.

*Manner* of: Never on foot or swimming. HOMEYER. 27. — Some Birds wander by walking or swimming. BREHM, CH. L. 7.

*Nature* of: Birds have an impulse for Migration and a homing sense. FABER. 1. — The impulse of Migration is hereditary, not gained by training. HOMEYER 14, — The migratory instinct is inherited. PALMÉN. 13. — Migration became hereditary. MARTORELLI. 1. — Birds are trained to wander. WEISSMANN. 4.

*Obstacles* in: Migrating Birds give way before hindrances. NAUMANN. 6. — Invicible hindrances cause deviation. HOMEYER. 9. — HIERONYMUS. 1.

*Order* of: Land Birds travel without distinct order, others in < order, one side being longer. EMPEROR FREDERIC. 13. — Separately according to age; in spring old ones arrive earlier, in autumn young ones depart earlier. GÄTKE. 11. — There exists a successive and by-passing Migration. PALMÉN. 11. — There is a head-, main-, and rear-part. HOMEYER. 6.

*Restingplaces* on: A certain quartering system is observed by wandering Birds. BREHM CH. L. 13. — Along the migration route there are certain places for rest. NAUMANN. 3. — There are regular and irregular resting-stations. HOMAYER. 11. — On the way Birds stop at quite inappropriate places. SEVERTZOFF. 2. — Over unfavourable districts Birds pass without a break. PALMÉN. 8.

*Routes* of: Birds migrate from colder regions into warmer ones and vice versa — passagium et reditus. EMPEROR FREDERIC. 1. — In both seasons not the same. GÄTKE. 3. — The spring and autumnal Migration not always on the same route. MENZBIER. 6. — There are certain recognized routes or highways of Migration. BREHM, CH. L. 12. — NAUMANN. 1. — MIDDENDORFF. 1, 2. — WEISSMANN. 5. — PALMÉN. 3. — MARTORELLI. 17. — MENZBIER. 1. — Each species travels by its own route. SEVERTZOFF. 1. — TRISTRAM. 4. — MENZBIER. 2. — Migration routes are the history of the distribution of the species. MENZBIER. 5. — There are Migration-routes. HOMEYER. 1. — GÄTKE. 12. — Migration-routes *scarcely* exist. KESSLER. 10.

*Time* of: There is a spring and an autumnal Migration. GÄTKE. 1, 2. — Smaller birds wander at dusk, large birds during the day, strandbirds at night. HOMEYER. 4.

*Orientation.* Inherited sense of orientation. WEISSMANN. 7. — Traditional heredity. PALMÉN. 13. — Is not infallible. MARTORELLI. 18.

*Original home* (Cfr. also Breeding places p. 87.) The Tropics, from whence emigration northward took place. DEICHLER. 4. —

The breeding regions; for our Birds therefore Europe. DEICHLER. 1. — In the glacial period the Tropics; and: The home of our migrating Birds are not the countries where they sojourn in summer, but southern regions. BRAUN. (II) 2, III (1).

*Passage* v. Migration.

*Return.* Always to the same place. HOMEYER. 16.

*Sense for locality* and direction strongly developed. HOMEYER. 17. (Cf. Instinct p. 89.)

*Settling in the breeding region.* Takes place from South to North. WEISSMANN 11. — In certain tropical species the other way, from North to South. FINSCH. 1.

*Straggling* (imperfect Migration). From mountains to valleys and vice versa. EMPEROR FREDERIC. 5. — SEVERTZOFF. 5. — In the Tropics from the mountains to the plains. TRISTRAM. 5.

*Weather.* Is of influence. EMPEROR FREDERIC. 10. — GÄTKE. 5. Is of great influence. KJAERBÖLLING. 2. - Is of essential influence. HOMEYER. 12. — KESSLER. 4, 5. — Has no decided influence. MARTORELLI. 3.

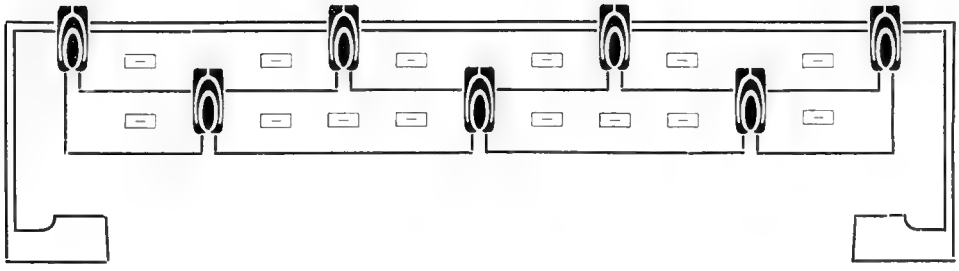
*Wind.* Contrary winds hinder Migration. EMPEROR FREDERIC. 11. Birds migrate with the wind. HOMEYER. 2. — Straggle with different winds. FABER. 4. — Travel against the wind. BREHM, CH. L. 6.

*Winter.* The previous winter has great influence. BREHM, CH. L. 2. — MIDDENDORFF. 8. — A mild winter forces on the spring Migration. FABER. 2.

The above summary is noteworthy in many respects. It proves that besides many congruent observations and opinions, there are others in direct contrast and no few merely hypothetical. Really, it is a field in which every thinking Ornithologist may create new Theses to any extent and more or less incredible. But whether in support of real and positive knowledge, may strongly be doubted. I only remember the stri-

king instances, that in the mind of some writers thousands, even hundress of thousands of years were necessary to establish Migration, whereas another is satisfied with merely 2000 years!

In looking back to the time of EMPEROR FREDERIC (XIII. century) we have a good measure for the valuation of many facts, as well as for the progress in our knowledge of Bird-Migration. — „Only perfectly feathered individuals migrate“ — „not all Birds are Birds of Passage“, and chiefly section 14: „the bird at the head of the procession < is relieved, because he has the hardest work, having to consider also dangers etc...“ This proves that the Emperor must have had on idea of the *work* accomplished by the leading bird and that his opinion on this subject is much closer to the results of modern knowledge, than that of some ornithologists, even of modern time, who still cannot do without the idea of leadership.



# CONCLUSION.

The chief object of the present paper is to intercede in favour of the promotion of *Ornithophaeonology* in a manner worthy of *its scien tific character.*

The critical Summary of categories, into which Ornithophaenology may be divided, clearly shows that our positive knowledge of bird-migration is still a very insignificant one; that so-called sentences (dogmas) prevail which sometimes sound very ingenious, but, critically taken, are void of every firm foundation.

The comparatively small intrinsic contents of Ornithophaenology are on one hand a consequence of the nature of the subject, viz. of the fact that we are only able to make observation of fragments of migration; that the observation of this interzonal phenomenon is carried out locally only, so that the connexion between the local phenomena or observations, is in the highest degree a loose one; and finally that the majority of observations in the whole is confined but to the palaearctic part of Europe; while on the other hand the observation lacks all organisation, and the working up of the results is not carried out according to a uniform method, both of which conditions are indispensable to the solution of so difficult a problem.

## CONCLUSION.

Considering this state of affairs, I propose:

1. Organisation of an international committee consisting of:

3 Ornithosystematicians

3 Ornithobiologists

3 Ornithophaenologists

3 Phytophaenologists

3 Meteorologists, who elect a president and a secretary.

2. The committee shall draw up a plan of observation of migration, chiefly in respect of

*a*) uniformity of data

*b*) uniform method of working up.

The complete plan worked out is to be brought before the V-th Ornithological Congress.

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# A VÁNDORMADÁR MIGRATORIA AVIUM

## A FÖLDGÖMB ORIENTALI

## FELÉNEK KELETERAE SEPTENTRIONALIS

a szerzök vonulási térképeidum chartas migrationis ab auctoribus

alapján összeállitotta: publicatas in usum

A MAGYAR ORNITHOLOGIAI NGARICI ORNITHOLOGICI CENTRALIS

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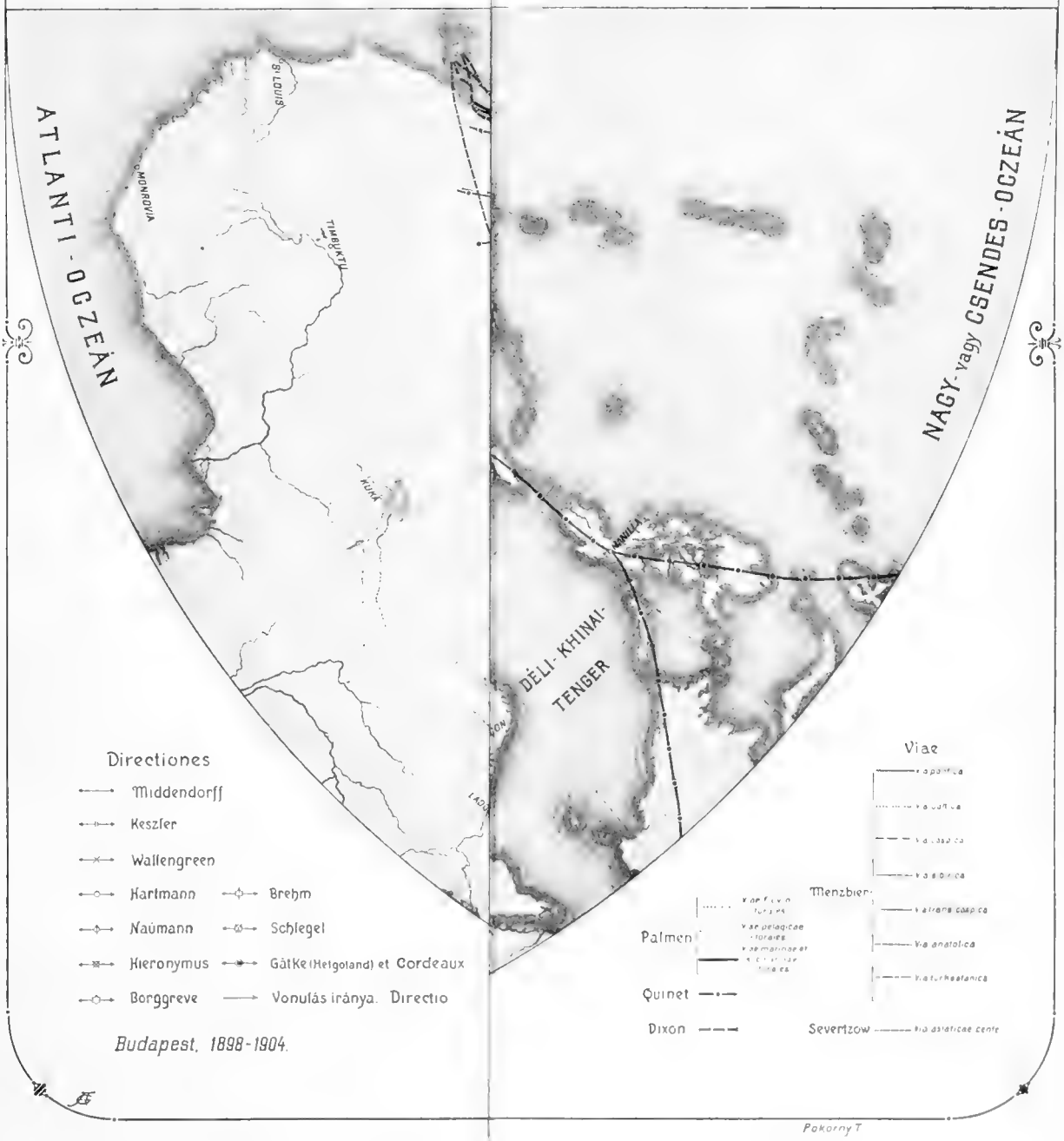


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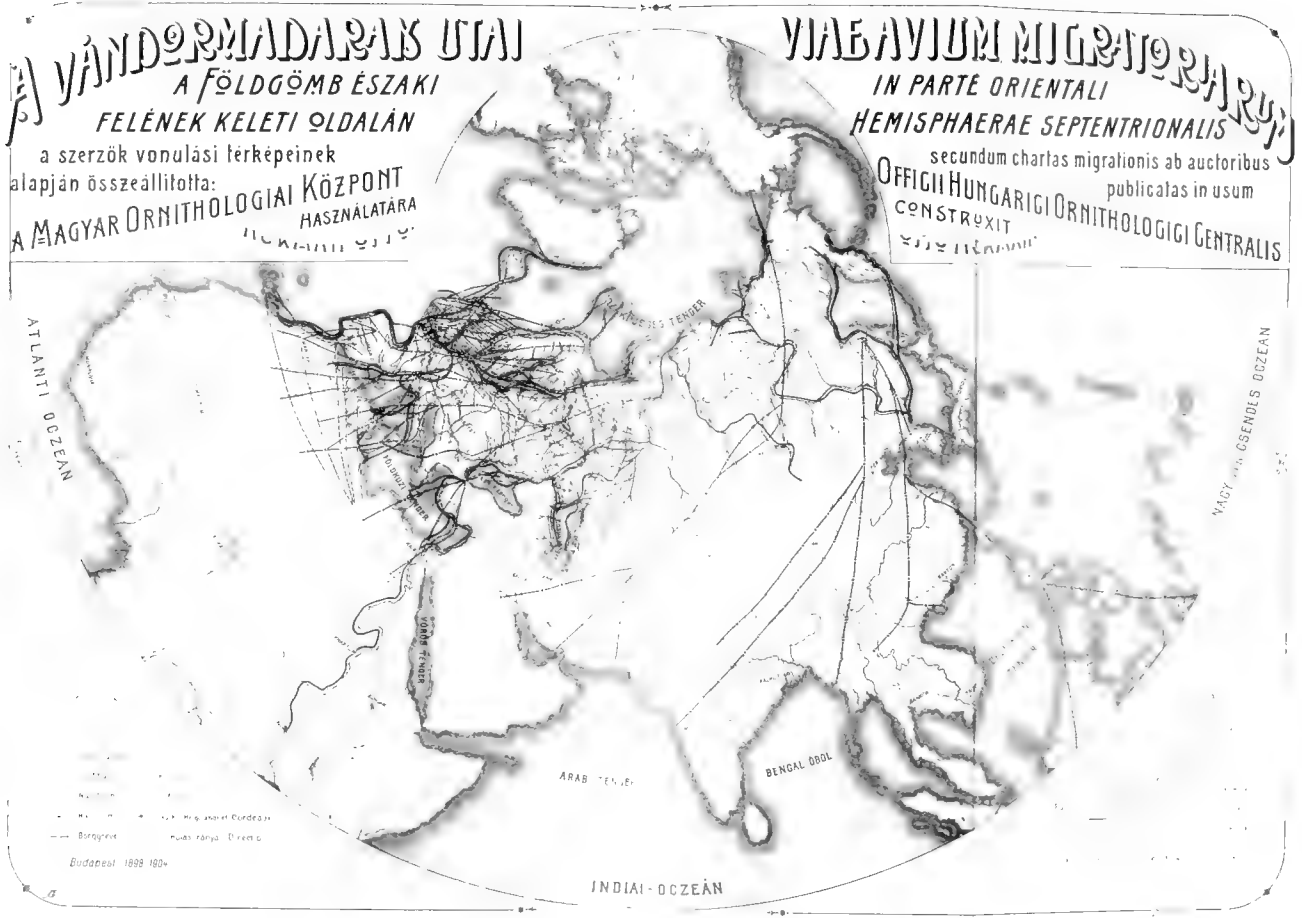
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VÖRÖS TENGER
BENGAL ÖBÖL
INDIAI-OCZEÁN
Budapest 1899 1904

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